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LOW RESISTANCE AIR FILTER DEVICE

5 TECHNICAL FIELD

The present invention relates to the technical field concerning filter devices ~~for~~ of the air destined to be used in an ~~the~~ air-fuel mixture sucked in by ~~the~~ combustion engines and ~~refers~~ particularly to a low resistance air filter device.

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The known filter devices comprise an air filter, having a form that may be flattened, cylindrical or conic, contained in a respective case having an inlet opening in flow communication with ~~the an~~ air ~~intakes~~ intake and a ~~further~~ having an outlet opening connected to the engine.

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BACKGROUND ART

It is ~~Are~~ known ~~that~~ cases which have openings ~~whose opening~~ connected to the engine, and ~~therefore~~ downstream of the filter in comparison to the air flow, will introduce ~~it~~ ~~introduces~~ strong resistances and turbulences that cause the drawback of reduced ~~to reduce~~ the air flow to the engine.

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It is ~~Are~~ known to provide cases for filters ~~provided~~ with an inner link between the inlet opening and the side wall sized ~~fit~~ to reduce the air resistance.

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A drawback of such filtering devices consists in that the link allows the passage of a possible extraneous object, for instance nuts or screw forgotten or fallen in the case of the filter, in the inlet collectors of the engine with serious damage risks ~~of this latter~~. The risk of an extraneous object being present ~~presence~~ is particularly relevant in a racing filter device as these ~~the race filter devices that~~ are continuously being opened for inspections, cleaning, substitution also during the hurried work being performed ~~phases of job~~ on different organs parts of the engine at ~~in~~ the same time.

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Further drawbacks of the said known filters ~~consist in the fact~~ are that they increase
~~increases~~ the weight and they reduce ~~reduces~~ the inside volume for the air.

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~~U.S. Patent No. Document US-A-4~~ 695 299 discloses a cyclone having at its upper
 outlet side a filter. The filter comprises a tubular housing having an inlet at its lower end
 and an outlet at its opposite upper end. A cylindrical filter element is installed in
 connection with the inlet opening and a tubular body forming the outlet opening
 protrudes towards inside said tubular casing.

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DISCLOSURE OF THE INVENTION

A purpose of the present invention is to propose an air filter device having low
 resistance and able to stop a possible extraneous object, also of big dimensions, within
in the case.

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~~A further~~ ~~Further~~ purpose of the present invention is to propose a device which reduces
~~to reduce the~~ air resistance without reducing the useful volume of the device and
 without getting heavy ~~it~~.

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~~Another~~ ~~Other~~ purpose is to propose a device that can be easily housed in the engine
compartment room.

The above mentioned objects are achieved according to the content of the claims.

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BRIEF DESCRIPTION OF THE DRAWINGS

The characteristics of the present invention are ~~detailed~~ underlined in the following with
 particular reference to the enclosed drawings, in which:

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- figure 1 shows a schematic longitudinal section view of the device of the present
 invention, taken along line I-I of Fig. 2;

- figure 2 shows a longitudinally sectioned side view of the device of the present invention ~~sectioned by a longitudinal plan perpendicular to the one sectioning figure 1;~~
- figure 3 shows a top view of the ~~figure 1~~ device of the present invention.

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BEST MODE OF CARRYING OUT THE INVENTION

With reference to figures 1 - 3, 1 indicates a low resistance filter device for the feeding of combustion engines mainly including a tubular case 2, a filtering element 3, support means 4 and an outlet means 8.

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The tubular case 2 has an elliptic or oval section and ~~it~~ is provided with an lower opening 9 and an upper opening 10. Furthermore the tubular case is preferably made of carbon fiber so that it ~~releases~~ acts as a thermal insulator between the external environment and the air passing through ~~crossing~~ it. The tubular case 2 is fixed to the support means 4 by fixing means ~~14~~ (not shown) consisting of a screw or of a fastener.

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The outlet means 8 are constrained to the ~~a~~ upper opening 10 of the tubular case 2 and ~~they are~~ centrally provided with ~~of~~ an outflow opening 7 in correspondence of which the outlet means ~~they~~ present a tubular body 11 protruding toward an inside of the said tubular case 2. ~~Such~~ The tubular body 11 provides connects, ~~in~~ flow communication, between the inside volume of the tubular case 2 and ~~with~~ the outflow opening 7 ~~the same.~~

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~~The form of~~ outlet means 8 ~~is similar to~~ has a trumpet shaped flange 11a which is integral with the tubular body 11 being shaped similar to a ~~as the~~ trumpet outlet.

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Preferably the trumpet flange 11a of the tubular body 11 expands, or enlarges, toward an inside of the device 1. In alternative, the invention provides that the tubular body 11 is narrowed, or is restricted, toward an inside of the device 1 assuming a truncated ogive shape.

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The outlet means 8 are peripherally provided of a recess 14 for the housing of the inside wall of the tubular case 2 in its upper opening 10. The outlet means 8 are detachably fixed to the tubular case 2 by means of screw or fastener fixing means (not shown) 45.

- 5 The device includes support means 4 fixed at the lower opening 9 of the case 2 and sized fit to retain ~~constrain~~ the filtering element 3 at an air one inlet opening 5 ~~for the air~~ of the support means 4 ~~the same~~.

- The support means 4 are discoid shaped and centrally provided with ~~of~~ the inlet opening
 10 5 linkable to ~~the~~ air intakes of a ~~the~~ vehicle. An inner throat of the support means 4 houses an end of the filtering element 3 that can be fixed integral with the support means 4, for instance by means of adhesive or plastic material melting. In the ~~the~~ alternative the end of the filter can be detachably housed in a respective throat of the support means 4, being an annular seat shaped seat ~~of the support means 4~~.

- 15 The support means 4 are peripherally provided of a seat 13 for housing the inner wall of the tubular case 2 at the lower opening 9. The support means ~~They~~ are made of nylon strengthened with glass fiber.

- 20 The filtering element 3 has a cylindrical form and is made of cotton soaked with low viscosity oil. It is internally provided with ~~of~~ air deflecting means 6, connected to a ~~the~~ free end of the filtering element 3 in such way that the air flow entering from the opening 5, and pointed out by the arrows F of figure 1, ~~it~~ is forcedly deflected by the deflecting means 6 toward the filtering element 3. The deflected air flow crosses the
 25 filtering element 3, ~~it~~ crosses the interspace formed by ~~this latter~~ the filtering element and the external case 2 and ~~it~~ exits, through the tubular body 11, out the outflow opening 7 ~~entering inside air ducts~~ in the direction of the engine.

- The deflecting means 6 are substantially shaped as a cone whose vertex is directed
 30 toward the inlet opening 5 and whose base is ~~integral~~ integrally fixed to the free edge of the filtering element 3 2. In the ~~the~~ alternative it is provided that the free edge of the filtering element 3 2 detachably matches the base of the deflecting means 6. The

substantially conic shape of the deflecting means 6 can have a concave profile 6a or convex 6b for instance of a parabolic kind. More particularly, the ~~in detail, said~~ almost conic shape of ~~said the~~ deflecting means 6 has an axial section shaped as two half-parabolas with parallel axes and joined branches at the vertex of the deflecting means 6 making the profile concave 6a or ~~the~~ convex 6b ~~profile~~.

The device includes spacer means 20, for instance made of plastics and of prismatic form, interposed between the tubular body 11 and the filtering element 3 and matching the inner wall of the tubular case 2 for the centering and stopping of the filtering
10 element 3.

The operation of the device provides that the recess 21 between the tubular body 11 and the inside wall of the tubular case 2 form a sort of trap fit to prevent or to reduce the risk of the passage, toward the engine, of extraneous objects such as nuts, screws, washer,
15 split pin and the like. The conformation of the tubular body 11 in a remarkable manner provides a low resistance and low dynamic losses of air flow feeding the engine without added weight-heaviness and without reducing the inside volume of the device ~~in a remarkable manner~~.

20 An advantage of the present invention is to propose an air filter device having low resistance able to stop an extraneous object, also having big dimensions, inside the case downstream of the filter without reducing the useful volume of the device and without making it getting heavy-it.

25 Another Other advantage is to propose a device that can be easily housed in the engine compartment through ~~room-trough~~ its oval or elliptic section shape.

CLAIMS

- 1) Low resistance air filter device comprising a tubular case (2) for at least a tubular shaped filtering element (3) fixed to a lower opening (9) of the case (2) said device being provided, at its opposite upper opening (10), of outlet means (8) provided with an outflow opening (7) for the air, said device (1) being characterized in that the outlet means (8), at the outflow opening (7) are provided with a trumpet shaped tubular body (11) protruding toward inside of said tubular case (2) and connecting, in flow communication, the inner volume of the tubular case with the outflow opening (7) the same; the inside of the free end of the filtering element (3) being provided with deflecting means (6) provided to forcedly deflect the air flow towards the filter.
- 2) Device according to claim 1 characterized in that the outlet means (8) are formed as a shaped flange integral with the tubular body (11).
- 3) Device according to claim 1 characterized in that the trumpet of the tubular body (11) enlarges towards inside of the device (1).
- 4) Device according to claim 1 characterized in that the trumpet of the tubular body (11) is narrowed toward inside the device (1).
- 5) Device according to claim 1 characterized in that it comprises support means (4) fixed at the lower opening (9) of the case (2) and fit to bind at one inlet opening (5) for the air of the support means (4) the same, said filtering element (3).
- 6) Device according to claim 1 characterized in that says outlet means (8) are peripherally provided of a recess (14) for housing the inside wall of said tubular case (2) at its upper opening (10).
- 7) Device according to claim 1 characterized in that says outlet means (8) are detachably fixed to said tubular case (2) by means of fixing means (15).

- 8) Device according to claim 1 characterized in that says deflecting means (6) are substantially shaped as a cone whose vertex is directed toward the inlet opening (5) and whose base is integral fixed to the free edge of the filtering element 2.
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- 9) Device according to claim 8 substantially characterized in that said almost conic shape of said deflecting means (6) has an axial section shaped as two half-parabolas with parallel axes and joined branches at the vertex of the deflecting means (6) making a concave (6a) or convex (6b) profile.
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- 10) Device according to claim 1 characterized in that says tubular case (2) has an elliptic or oval section.
- 11) Device according to claim 1 characterized in that says tubular case (2) is made of
- 15 carbon fiber.
- 12) Device according to claim 1 characterized in that says filtering element (3) it is in cotton soaked with low viscosity oil.
- 20 13) Device according to claim 1 characterized in that said support means (4) are peripherally provided of a seat (13) for housing the inside wall of said tubular case (2) at its lower opening (9).
- 14) Device according to claim 1 characterized in that said tubular case (2) is detachably
- 25 stopped to said support means (4) through fixing means (14).
- 15) Device according to claim 1 characterized in that said support means (4) are made out of nylon strengthened with glass fiber.
- 30 16) Device according to claim 1 characterized in that says filtering element (3) is cylindrical.

- 17) Device according to claim 1 characterized in that it includes spacer means (20) positioned between the tubular body (11) and the filtering element (3).
- 18) Device according to claim 19 characterized in that the spacer means (20) matches the inside wall of the tubular case (2).
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ABSTRACT

A low resistance air filter device comprises a tubular case (2) for containing at least a filtering element (3) fixed to a lower opening (9) of the case (2). ~~This latter~~ The tubular
 5 ~~case is provided, at its opposite~~ has an upper opening (10), with ~~of~~ outlet means (8) provided with an air outflow opening (7) ~~for the air~~. The outlet means (8), at the outflow opening (7), are provided with ~~of~~ a tubular body protruding toward an ~~inside of the said~~ tubular case (2) and connect in flow communication the inside volume of the tubular case with the outflow opening (7) ~~the same~~.